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FAO PLANT PROTECTION BULLETIN

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FAO Plant Protection Bulletin

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World Reporting Service on Plant Diseases and Pests

Antibiotics and Plant Protection

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THE use of antibiotics as protective or therapeutic agents against plant diseases is one of the rare instances where drugs that are found and developed for the relief of human ills can be applied for the benefit of agriculture. To those who are acquainted with the literature of plant pathology this genesis is not surprising. Antibiosis is an old phenomenon to the plant pathologist. Another interesting fact not known by many people is that the first of our modern antibiotics, gliotoxin, was discovered and crystallized by a plant pathologist even before penicillin had been purified. This agent is an antifungal material and its role in plant protection was investigated as early as 1933. Furthermore, soon after penicillin and streptomycin were isolated, these materials were used by a number of plant pathologists to determine their value against bacterial infections of plants. Other investigators studied the phenomena of these antibiotics in the plant itself, such as their absorption, translocation and toxicity. At that time one could do little more than small scale experiments because the supply of antibiotics was not even enough to satisfy the human needs for these drugs and their cost was extremely high. Conditions have now changed. Manufacturing capacity is more than adequate to satisfy all the medical demands for some of these drugs and the costs have dropped considerably. Furthermore, the manufacturers who produce these compounds have realized the importance of plant diseases and of the tremendous markets which are available for good bactericides and fungicides.

Antibiotics as Sprays

A number of antibiotics have recently been tried for the control of plant diseases on experimental plots or commercial fields with very promising results. These compounds are applied to plants in many different ways. The most common type of application has been to spray solutions of the antibiotic on the leaves of the plant. By this method startling control of fire blight (*Erwinia amylovosa*) has been achieved. Previously no efficient control of this disease was known and the commercial cultivation of pears had ceased almost entirely in many areas of the United States because of the ravages of this disease. Streptomycin gave almost perfect control of fire blight on both apples and pears. A concentration of between 100 and 120 parts per million, applied in seven sprays from the early bloom stage to petal drop, reduced both the blossom blight and twig canker to the disappearing point. Even fewer applications give effective control if used at the right time in the development of the disease. Similar treatments of tomato and pepper seedlings with concentrations as low as 20 p.p.m. have resulted in control of bacterial spot (*Xanthomonas vesicatoria*) on these crops. Common blight of beans (*Xanthomonas phaseoli*) has been prevented in commercial fields by spraying with streptomycin at 200 p.p.m. This antibiotic will also control wildfire of tobacco (*Pseudomonas tabaci*) in seedling beds, when sprayed at the rate of 200 to 400 p.p.m., even if plants have already been infected. Another antibiotic which has been extensively tested is

terramycin (oxytetracycline). This drug has also given some control of bacterial diseases but since it is inferior to streptomycin, higher dosages are necessary to produce similar effects.

An antifungal agent, actidione (cycloheximide), which was originally developed for the control of human pathogens, is also effective when sprayed on vegetation. Cherry leaf spot (*Coccomyces hiemalis*) can be prevented by the application of this antibiotic at various periods during the growing season. At present it is used before fruit formation and after the cherries have been picked. However, recent residue studies indicate that it most probably can be applied to the tree even during the time that the fruit is forming without leaving toxic residues. Actidione is also used in the control of a certain turf disease. It is very effective against the powdery mildews of various crops, though the toxicity of the compound to the host plant must be considered in determining whether its use is feasible. It is the only antibiotic which thus far has reduced stem rust on wheat, but in this instance tip burning was encountered on Marquis wheat.

Seed Treatments

Another promising use of antibiotics is in seed treatment. A marked reduction in wildfire resulted when tobacco seeds were treated with solutions of streptomycin. The reduction in disease was greatest when the seeds were treated before inoculation with the pathogen, though good results were also obtained when the treatment was applied as much as three days after the inoculation. Soaking oat seeds with actidione solutions prior to planting prevented covered smut. Even deep seated infections of seeds by fungi such as *Aschochyta* on peas were eradicated with this antibiotic. A similar type of treatment with helixin B reduced the *Helminthosporium* diseases of oats and barley. This compound is the same as the antibiotic endomycin. Studies are also underway in which actidione is used as a dust in the treatment of seeds.

Therapeutants

Antibiotics can be used to combat disease in still another way; the host plant can be placed in solutions of the antibiotic from which it will absorb the antibiotic into the tracheal stream. Cut shoots or other plant parts such as twigs can be used, or else the antibiotic can be absorbed through the roots. A number of studies have shown that antibiotics differ in their ability to be absorbed by roots. Even if they do reach the tracheal stream some of them cannot be readily translocated or transported. Streptomycin, chloromycetin and griseofulvin can all be absorbed by the roots of plants and translocated to the leaves. When the infection is in the xylem, translocation may not be necessary. For certain diseases cut shoots can be placed into antibiotic solutions and the antimicrobial agents drawn up into the xylem by the transpiration stream where they can inhibit the development of the pathogens. This type of control measure is especially applicable when plant parts are to be vegetatively propagated. Often stocks of great value are diseased and therefore have to be discarded. Budwood of plum trees has been freed of *Phytomonas pruni* by soaking infected twigs in solutions of streptomycin. This antibiotic was also used to free chrysanthemum cuttings from *Erwinia chrysanthemi*. The cut plants could be planted in sand and the solution applied to the sand. It was found that even rooted plants absorbed the antibiotic from sand. Under these conditions the pathogen was eradicated and infection prevented.

Other Applications

Many other methods have been tried to combat diseases with these agents. Streptomycin has been applied to beans as a lanolin paste and has been found to be absorbed and translocated. It has been mixed with hormone powder and used in the rooting of cuttings. The antibiotic has been injected in trees by various techniques and shown to have protective activity against certain pathogens. Potato tubers have been soaked in antibiotic solution to control ring rot (*Corynebacterium sepedonicum*).

Mode of Action

Some antibiotics such as streptomycin when used as a spray or a dip appear to be absorbed by the leaves of the plant and therefore inhibit the pathogen after it enters

the host. Actidione, on the other hand, is more typical of the usual fungicide in that it is used as a protectant on the surface of the leaf. Both materials appear to have eradicant activity. The ideal type of treatment would be a soil drench. The plant could then absorb the antibiotic from this substrate and transport it to the locus of infection. With the materials now available this procedure does not seem practical. Many of the antibiotics are not stable nor do they remain free in soil. Some are labile to the *p*H of soil, others combine with the active chemicals in soil, while still others are absorbed on the soil colloids. Finally, all the antibiotics which have been investigated until now are broken down by the microflora of the soil.

Antibiotics can be very specific in the type of organism which they inhibit. Some will inhibit only a few species of micro-organisms while others will inhibit a wide variety. Some are active against fungi and others against bacteria and a few against both types. Many compounds are more or less selective on the basis of the gram-staining characteristics of the bacteria; some prevent the growth of gram-positive but not gram-negative bacteria. Since most of the plant pathogenic bacteria are gram-negative, penicillin, which inhibits primarily gram-positive bacteria, has not been a good agent for the prevention or treatment of bacterial diseases of plants. The broad spectrum antibiotics, streptomycin and terramycin, which also inhibit gram-negative organisms, are most useful,

Finally, from the information now available it appears that the antibiotics are most active against growing cells. Higher concentrations are necessary to kill spores of *Bacillus subtilis* than to kill vegetative cells. One can expect then that fungi would be most readily killed when spore germination begins or even when they are in the mycelial stage.

Materials Available Commercially

The two antibiotics on which the greatest amount of research has been done are now commercially available for agricultural purposes. One is the antifungal agent actidione and the other the antibacterial streptomycin. Streptomycin is sometimes mixed with terramycin. Terramycin is inferior to streptomycin as a plant protectant, but has been added to prevent the rise of strains of the pathogen which are resistant to streptomycin.

The Future

This review of the current status of antibiotics in plant protection has dealt with only a few of the materials which have been investigated. These have been chosen primarily because enough of the compounds are available for extensive experimentation. Many other materials have been omitted on which only scattered studies have been made and which might be of even more value to agriculture in the future. A large expansion in the application of antibiotics to agriculture should take place in the near future, since many commercial companies have planned research programs specifically to develop antibiotics for the protection of plants from disease. Many antibiotics which had been previously discarded because they have been too toxic for human use will now be tested for their use in plants. Still more important, many new organisms are now being isolated from soil and are being tested for their ability to produce antibiotics which will control plant diseases.

Unusual Incidence of Diseases Affecting Economic Plants in Northern Italy

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SINCE 1949, an extensive survey of plant diseases has been carried out in the Romagna (Emilia) region and other parts of northern Italy by the Institute of Plant Pathology of the University of Bologna and the joint Experimental Laboratory of the Ministry of Agriculture and Forestry. The Romagna (Emilia) region is among the most important agricultural areas in Italy, not only because of the intensive cultural practices and the variety of crops grown but also because of the high level of cultural techniques developed. Consequently problems relating to plant protection have also received great attention.

The following notes summarize some unusual records on the current disease incidence, which are either new in this country or present some characteristics previously unrecorded.

Ergot on Wheat in Po Valley

During the recent survey in northern Italy, in which the writer and his colleagues have taken part, a very uncommon phenomenon was encountered in the Po Valley, i.e., the discovery of a remarkably large quantity of sclerotia of ergot (*Claviceps purpurae*) in the threshed wheat. The center of infection appeared to be in an area between the Provinces of Modena and Reggio Emilia, south of the Po River. In this area heavy ergot infection was also found on wild grasses.

This discovery seriously alarmed the public health authorities, who were aware of the consequences of using such contaminated grains for consumption. However, a later and more intensive examination revealed that the contamination of ergot sclerotia was in general low elsewhere, with an average of 5 to 6 grams and a maximum of 30 to 35 grams in each metric ton of wheat grains. Previously, the Italian law did not permit the presence of ergot in any amount in cereals used for food, but now the public health authorities of the central government have established a maximum tolerance of 60 grams per metric ton.

The ergot normally appears in Italy only in the fields on high hills and mountains and is confined almost exclusively to rye. On this host, its natural infection may be so heavy that the sclerotia may be gathered for medicinal purposes. Its exceptional occurrence on the flat land of the Po Valley, as in the case reported above, is considered to be due to the unusually humid weather prevailing at the blooming period of cereals and grasses this year and in 1953.

Virus Diseases of Sugar Beet

Three virus diseases, namely sugar beet virus yellows, beet mosaic and sugar beet yellow-net, were first observed in the Emilia region a few years ago, and since then their spread and effects on beet production have been closely followed. These diseases were not previously known to occur in Italy, or at least their presence was uncertain.

Sugar beet virus yellows has been present so far mainly in the northern parts of the country, such as the Provinces of Bologna, Ferrara, Ravenna and Rovigo, but it may also be found in the central parts in the Fucino area and in the extreme south in Calabria. However, in every case observed diseased plants were present only in very small percentages.

The beet mosaic occurs mainly also in northern Italy, more frequently in the seed-producing fields. The yellow-net disease, on the other hand, has been seen in both the north and the south. This disease was described only recently by Sylvester[1] and is still of limited geographic distribution.

[1] SYLVESTER, E. S. "The yellow-net virus disease of sugar beets," *Phytopath.* 38: 429–439. 1948.

Generally speaking, these three virus diseases have not so far caused any significant damage to sugar beet growing in Italy.

The most common vector of these diseases found in 1953 was *Aphis fabae* which, as is generally known, is not an active or efficient vector in transmitting such diseases.

A new type of virus yellows, designated as Romagna yellows, was recently found in Romagna and appears to be more virulent than the normal type. It is characterized at the early stage of development by yellowing of secondary veins which appears first in some leaves at the center of the plant. At later stages, when the yellowing spreads to the whole leaf blade, the Romagna yellows is not distinguishable from the normal type of virus yellows. The Romagna yellows also causes significant anatomical changes in sugar beet plants, including hypoplasia of the fibro-vascular elements and of the surrounding parenchyma. A detailed report on this disease will be published elsewhere by A. Canova.

Leaf Blotch of Horse-Chestnut

During the past few years, the leaf blotch disease caused by *Guignardia aesculi* has been continuously on the increase and in 1954 has reached remarkable proportions, practically throughout the whole peninsula. In August this year, leaves of a great number of horse-chestnut (*Aesculus hippocastanum*) trees planted at roadsides and in parks turned conspicuously yellow and later became red with a scorched appearance. Since the early part of September, heavy defoliation has taken place (Figure 1).

The disease is characterized by well-known symptoms. Large chlorotic spots, which later become increasingly dark in brick-red color, are surrounded from the beginning by a yellow halo that often extends to the whole leaf. On the diseased tissues, pycnidia of the causal fungus occur abundantly.

Figure 1. Defoliation of horse-chestnut due to infection by *Guignardia aesculi*.

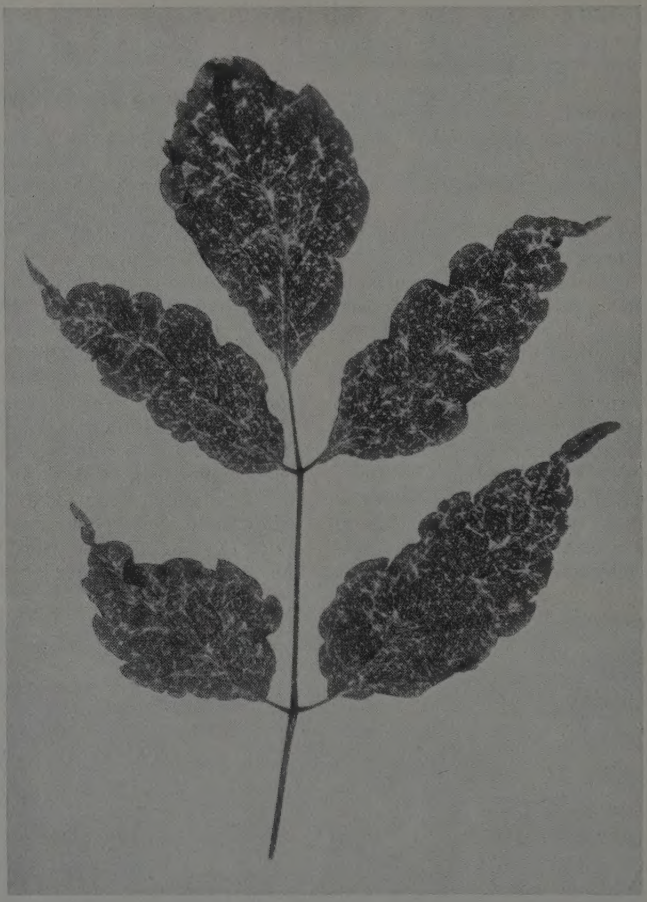

Figure 2. Symptoms of mosaic disease on leaves of *Acer negundo*.

It was observed that not all trees of horse-chestnuts are equally susceptible to this disease. In places where the attack was so heavy as to cause complete defoliation in certain trees, some nearby trees were found to retain nearly the normal foliage and appeared quite healthy.

Silver-leaf of Peach

For about thirty years, peach orchards in the Romagna (Emilia) region, especially in the Provinces of Ravenna and Forli, have suffered from outbreaks of the silver-leaf disease, which recur at more or less infrequent intervals. The first serious outbreak was observed in 1924-25; a second of lesser intensity occurred during 1931-32; and the present outbreak, which is the most prevalent of all, began three or four years ago and has been continuing without any sign of decline.

The general characteristics of this disease are the silvery appearance of the foliage, which becomes visible from the very early stage of the attack and usually as soon as

the buds begin to open, the thickening of the whole leaf with crinkles on the lower side, and sometimes chlorosis and deformation of the leaf. The internal changes in the affected leaves consist of the separation of the palisade tissue from the upper epidermis and the separation of palisade cells from one another and between the palisade tissue and the spongy tissue. There is a strong tendency for the elements of the palisade parenchyma to become dispersed, thus making the palisade tissue resemble the spongy tissue. The wood of the invaded branches shows brownish discoloration due to the formation of gum in both the vessels and the wood-parenchyma, and sometimes also in the cells of medullary rays.

The nature of this disease has not yet been definitely determined. In several cases *Stereum purpureum*, the fungus to which silver-leaf is commonly attributed, has been isolated from affected trees and the characteristic symptoms mentioned above have been reproduced by inoculations. However, attempts to establish the relationship between this fungus and the disease failed in most cases, no matter from what part of the diseased tree the isolation was made. The fruitifications of the fungus rarely appear on affected peach trees which are either succumbing to or recovering from the attack. On the other hand, the fruiting bodies of the fungus are found frequently on branches of poplar used as fence.

Since it was suspected that an infectious, but non-parasitic, principle might be involved, tests were made by grafting diseased scions and buds to healthy stocks. However, in no case was the disease transmitted to the stocks in this way.

The possibility that the disease is caused by nutritional deficiency was excluded from the outset, because of its wide distribution, its occurrence on all kinds of soils and the frequent sudden recovery of diseased plants.

The silver-leaf disease described above is also called the "spring silver-leaf", in order to distinguish it from the "late silverleaf" which appears usually in the summer and does not cause the profound anatomical changes in the leaves and in the woody organs. This latter type of silver-leaf, despite its conspicuous appearance, does not significantly affect the physiological functions of the plants, and is due to the intense summer heat which usually occurs in the beginning of July and often continues for some time afterwards.

Discovery of Acer Mosaic

For some years a number of trees of box-elder (*Acer negundo*) have shown intense mottling on the foliage. Chlorotic areas, varying from dots to star-shape and frequently confluent into irregular spots of several millimeters in diameter, intersperse over the whole leaf (Figure 2). At the advanced stages of development, the leaf becomes crinkled and depressed.

The disease appears to be similar to that described by Atanasoff[2] from Bulgaria, although he did not indicate any structural changes of the affected leaves. Judging from its symptoms, this disease is believed to be of virus origin. Experiments to establish its cause are now being carried out.

[2] ATANASOFF, D. "Old and new virus diseases of trees and shrubs," *Phytopath. Zeitschr.* 8 : 197–223. 1935.

Plant Disease Situation in the United States [1]

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A Strawberry Disease New to Arkansas

A severe outbreak of an undetermined strawberry disease, apparently of virus origin and relatively new to Arkansas, was encountered this season. The disease resembles the effects of aster yellows virus in strawberries reported from California, [2] and chlorotic phyllody described from Louisiana. [3] There is no previous record of this disease in Arkansas except for a few specimens encountered in 1953 in two strawberry plantings in White County, where the diseased plants were again found in early May 1954.

The disease was observed in all but a few of the numerous strawberry plantings throughout northern and central Arkansas examined during May 1954. The extent of the disease in each field varied from a few scattered plants to as many as 20 percent of the plants affected. Diseased plants were scattered at random in each field. Severity of the disease could not be correlated with the location of plantings, source of planting stock, or cultural practices. The age of the planting, however, appeared to have some bearing upon the number of plants showing symptoms. Young vigorous plantings one or two years old generally contained most diseased plants, whereas in older plantings usually only a few diseased plants were seen. Diseased plants were observed in fields set out earlier in the spring of 1954.

Three sets of disease symptoms have been noted. Although each may be a separate disease, until more information is obtained they are being considered different manifestations of the same disease.

One set of symptoms resembles closely those described from California and Louisiana. These plants are small and clumped in appearance, and exhibit phyllody of the flowers. Plants with these symptoms were noted only rarely.

The most commonly encountered diseased plant is one with the outer leaves lying flat to the ground with the leaflets curled upward (Figure 1). Petioles and stolons tend to be red rather than green. New leaves are dwarfed, leaflets are cupped with chlorotic edges. Fruit does not develop normally but remains as green buttons until becoming dried and shrivelled. These symptoms resemble those described for the strawberry yellow-edge virus in susceptible varieties. Since the variety Blakemore, which is used in practically all commercial plantings in Arkansas, does not manifest leaf symptoms when affected by the yellow-edge virus, there is no possibility of confusion of this new disease with yellow-edge.

The third set of symptoms, noted in relatively few fields, involves a sudden wilting and death of the diseased plant. The sudden wilting is not associated with any evident injury to the roots or crowns.

Since this disease was not noted prior to 1953 in Arkansas, its development in 1954 represents an alarming increase. Although symptoms resembling this disease have been noted, as mentioned, in other parts of the United States, there does not seem to be any other record of a severe outbreak.

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[1] This report is based upon material submitted by Collaborators of the Plant Disease Epidemics and Identification Section, Agricultural Research Service, United States Department of Agriculture.

[2] FRAZIER, N. W. and THOMAS, H. E. "Strawberry a host of western aster yellows virus," *Plant Dis. Reptr.* 37 : 272-275. 1953. (see *FAO Plant Prot. Bull.* 1 : 148–150. 1953.)

[3] PLAKIDAS, A. G. "Chlorotic phyllody of strawberry," *Plant Dis. Reptr.* 35 : 495-496. 1951.

Figure 1. A new disease on Blakemore strawberry. *Left*- healthy plant. *Right*- infected plant.

Diplodina Rot of Peaches in South Carolina

In July 1953 the Market Pathology Laboratory in Chicago received Elberta peaches that had been included in a commercial shipment from South Carolina. These peaches were held for a week at 80° to 90° F. Most of the fruit became infected with brown rot (*Monilinia fructicola*) but a number showed a different type of infection. When zonation was conspicuous, the early symptoms of this infection appeared similar to those of anthracnose (*Glomerella*); when it was not apparent the decay might have been confused with brown rot. As the rot progressed, the lesion was sharply delimited and a fine wrinkling of the darkening epidermal tissue occurred. Small black pycnidia were apparent at this stage.

Inoculations of market-ripe peaches produced lesions corresponding closely to the originals. Progress of the decay was rapid, approximately half of a peach being affected in six days at 80° to 90°F. Internal decay was equally rapid, the invaded tissue presenting a soft, moist, light-brown appearance. Early stages of mummification were often evident a week after inoculation, with the affected area of the peach displaying slight sinking, wrinkling, and a leathery texture to the touch.

In 1952 a peach disease closely similar to this one was described from Louisiana. [4] The causal fungus of the Louisiana disease was then tentatively identified as a *Diplodina* and has recently been described as *D. persicae* Horn & Hawthorne. A comparison of the Louisiana and the South Carolina organisms did not reveal any significant differences. The apparent ease with which the fungus infects the peach fruit, its demonstrated ability to spread by contact, and the rapidity with which it rots the fruit suggest a potential source of trouble to both grower and shipper. Temperature studies in Louisiana indicate that little, if any, growth is made by this fungus at 55° F. Prompt precooling of peaches and shipment under standard refrigeration should effectively control this decay during transit.

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[4] Horn, N. L. "*Diplodina* on peaches in Louisiana," *Plant Dis. Reptr.* 36 : 351. 1952. (See *FAO Plant Prot. Bull.* 1 : 37. 1952.)

Powdery Mildew on Almonds

The conidial stage of a powdery mildew, apparently *Sphaerotheca pannosa*, was found on an unknown variety of almond (*Prunus amygdalus*) at the Washington State College Tree Fruit Experiment Station in June 1954. The fungus caused buff lesions on the fruit, measuring up to 3/4 inches in diameter. The conidia were present in abundance on the fruits, but no lesions were seen on the leaves as late as the last examination in mid-July. The tree was sprayed with 1/2 lb. Karathane (Dinitro capryl phenyl crotonate) in 100 gallons of water on 29 June. No further spread of the powdery mildew took place, although in Washington this material has caused shot-hole in peaches even at the 1/2 lb. rate. Powdery mildew on almonds apparently is very rare. This seems to be the first report from the United States. The *Review of Applied Mycology* for the past 26 years contains only one report of *S. pannosa* on almonds from Malta, and a report of *Phyllactinia salmonii* (*P. corylea*) on almonds from India.

Outbreaks and New Records

Italy

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New Records of Tomato Diseases

GRAY LEAF SPOT. This disease, caused by *Stemphylium solani* and previously unrecorded in Italy, has been identified during the past few years in various parts of the peninsula and in Sicily. It was first observed in 1950 at Fiumicino near Rome and then in 1951 around Naples. In 1954, outbreaks of economic importance occurred in eastern Sicily from Barcellona, province of Messina, to Pachino, province of Siracusa. It is believed that the disease is not a recent introduction but has existed in Italy for years. Previously it was probably mistaken for early blight caused by *Alternaria solani*.

Figure 1. Infection of *Myrothecium roridum* on tomato stem.

In all the areas where it occurs, gray leaf spot has not been seen until September or later. It appears, therefore, that the disease can cause serious losses only in Sicily, where tomatoes commonly grown on the sea coast are transplanted in July and August and ripen in November and December. On the peninsula the disease usually appears shortly before harvest and will not normally cause any significant damage to the plants.

MYROTHECIUM ROT. At Scafati, near Naples in the south, *Myrothecium roridum*, the parasitism of which had been much discussed for many years, was found for the first time in Italy. Its first occurrence was recorded at the beginning of October 1952, after an unusually long spell of heavy rains.

The fungus causes brown depressed spots on the stems and petioles near the soil level (Figure 1), leading to the decay of the distal parts of the affected organs.

SINGLE VIRUS STREAK. In early September 1954, tomato plants grown near Parma in northern Italy were observed to be attacked by a virus disease unknown before. Peculiar streaks occurred on the young stems of the affected plants and irregular dark markings were abundant on the foliage. Observations made by Dr. K. M. Smith, and laboratory tests carried out by him at the University of Cambridge, seem to indicate that the disease is identical with the one known as single virus streak which is caused by *Lycopersicum* virus 1.

Seychelles

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First Record of Citrus Black Fly

Specimens of the citrus black fly (*Aleurocanthus woglumi* Ashby) have been received from the Seychelles, where a sudden outbreak has caused the death of many lime and orange trees.

There is no previous record from the Seychelles, in spite of the fact that local planters believe that, although this is the first time that it has occurred on such a scale, the insect has been present for many years.

Spraying with Kerosene-soap emulsion has had some controlling effect.

Plant Quarantine Announcements

Italy

Ministerial Decree of 16 September 1954, published in the *Gazzetta Ufficiale della Republica Italiana*. No. 219, 23 September 1954, contains regulations governing the importation of potatoes for the 1954-55 season. The text of this Decree is essentially identical with those for previous seasons.

The Decree authorizes the importation of seed potatoes for the 1954/55 season (24 September–15 April) under specified conditions, in derogation from the prohibition specified in the Ministerial Decree of 24 March 1948. Importation is subject to authorization by the Ministry of Foreign Trade, in consultation with the Ministry of Agriculture and Forestry. In cases where the customs offices are authorized to permit importation directly, customs clearance shall be based upon a certificate issued by the Ministry of Agriculture and Forestry attesting that the seed potatoes imported conform to the required technical and phytosanitary standards. Such cases include the importation of seed potatoes from member countries of the Organization for European Economic Co-operation (OEEC), under the terms of the Ministerial Decree of 21 September 1949.

Customs clearance of imported seed potatoes shall take place only at the following customs offices: Como, Domodossola, Fortezza, Verona, Pontebba, Ancona, Genoa, Savona, Leghorn, Venice, Naples, Bari, Catania, Modena, Turin, Ventimiglia, Tirano (Sondrio), Palermo, Messina, Cagliari.

Seed potatoes to be imported under the terms mentioned above must originate from plants grown for seed production, in compliance with the legislation of the country of origin and with the Italian requirements. The produce must belong to the highest grade in accordance with the seed potato classification established by the producing country. The importation of tubers of grades immediately inferior may be permitted only in special cases.

The phytosanitary condition and genetical qualities of seed potatoes to be imported must be guaranteed by the competent inspection service of the country of origin. The tubers must be sound, clean, well-formed and possess all the characteristics of the declared variety. Produce originating from plants infected by virus diseases or originating from localities infested by ring rot (*Corynebacterium sepedonicum*), wart disease (*Synchytrium endobioticum*), flea beetles (*Epitrix cucumeris, E. fuscula*), and potato tuber worm (*Phthorimoea operculella*), or any other pests not permitted by the producing country in potato grading shall be prohibited importation. Each consignment must be accompanied by a certificate attesting origin and sanitary condition and a certificate of field inspection, in the forms prescribed in the Decree.

The seed potatoes must be imported and distributed in original containers, sealed by the inspection service of the country of origin and provided with a label indicating the variety, the genetical classification, and the name and address of the producer.

The Decree also authorizes, until further notice, the importation of potatoes for consumption; the requisite regulations, are to be issued by the Ministry of Agriculture and Forestry.

Spain

An Order of 29 July 1954 laying down regulations for the prevention or control of invasion, spread and development of nematode parasites harmful to agricultural production, published in the *Boletín Oficial del Estado*, Vol. 19, No. 217, 5 August 1954, refers particularly to the golden nematode, *Heterodera rostochiensis*. The Order extends control not only to imported potatoes but also to domestically-produced seed potatoes and seed potatoes for export.

The Plant Diseases and Pests Service of the Ministry of Agriculture is to establish a Nematology Section to plan and develop control action.

The importation of potatoes remains subject to the conditions specified in the Ministerial Order of 10 December 1949, as modified by Order of 5 October 1950. The Phytopathological Inspection Service and other Services with similar functions will inspect potato shipment at the points of entry and will determine safeguard measures needed.

In the growing areas of seed potatoes for export, an inspection service will be established to survey the crop and to collect soil and plant samples for the purpose of determing the foci of infestation.

The Directorate-General of Agriculture will, on the basis of the survey results, determine the zones of invasion or of control, to which specific measures will be applied.

Yugoslavia

A Basic Act relating to plant protection against injurious diseases, insects and animals of 15 June 1954, published in the *Sluzbeni List* No. 26, 23 June 1954, comprises the following Parts:

I. General regulations.
II. Prophylaxis and treatment of diseases, insects and animals injurious to plants.
III. Control of the sale of products used for plant protection.
IV. Inspection relating to plant protection.
V. Penalties.
VI. Temporary and permanent regulations.

Included under Part II are provisions for the sanitary control of plants to be imported and exported and in transit, which contain the following points.

Imported plants, soil or organic manure, as well as their packing, must be inspected at the point of entry. If shipped by post or air, they will be inspected at the customs. All the shipments must be accompanied by a phytosanitary certificate issued by the competent service of the exporting country, attesting freedom from diseases and harmful insects and animals. If not accompanied by such a certificate or if found to be infected or infested, the shipment will be refused entry. The Secretary for Economic Affairs of the Federal Government may restrict or prohibit the importation into or transit through Yugoslavia of plants coming from countries in which harmful diseases, insects or animals are known to occur, unless otherwise arranged by international agreements.

Plants in transit must also be accompanied by a phytosanitary certificate. If transported by railroad or air, the plants must be packed in a sealed wagon or in a container which will prevent the spread of diseases or harmful insects and animals. The Secretary for Economic Affairs is authorized to determine whether inspection is compulsory in such cases. Transit of plants by sea or waterway is permitted only if the plants are found free from dangerous diseases, insects or animals by inspection at the port of entry.

The Basic Act came into force eight days after publication and revoked certain earlier orders relating to plant protection.

News and Notes

FAO Meeting on Desert Locust Control

A Working Party on Desert Locust Control, convened by FAO, met in Rome from 13 to 17 September 1954. The session was attended by delegates from Egypt, Ethiopia, France, India, Iraq, Italy, Jordan, Lebanon, Pakistan, Saudi Arabia, Spain, Syria, the United Kingdom, the United States of America and Yemen, and by observers from the Arab League and the World Meteorological Organization.

In reviewing the locust situation, it was concluded that the extent of the desert locust plague had again attained critical proportions. Breeding was particularly serious in the Sudan, Ethiopia, Somaliland and India. The wide extent and intensity of the summer breeding made it highly probable that the Arabian Peninsula would be subject to a very serious invasion during the coming winter, resulting in large-scale breeding. The Working Party considered that intensive control measures there might reduce substantially the danger of further disastrous developments of the plague during 1955.

Detailed plans were therefore prepared for an international campaign in the Arabian Peninsula, including Saudi Arabia, Yemen, the Persian Gulf States and Oman, during the winter-spring breeding period of 1954-55. Towards the total cost of the campaign, estimated at about U.S. $ 1,250,000, twelve countries offered contributions which, together with the balance remaining of equipment and supplies contributed by governments and FAO to the 1954 campaign, were valued at U. S. $ 913,000. FAO offered an additional contribution of at least U. S. $ 150,000. The campaign area was divided into ten operational sectors allocated to control teams to be supplied by Egypt, India, Iraq, Jordan, Pakistan, Saudi Arabia, Syria, the United Kingdom and Yemen. It was also proposed that the whole campaign should be coordinated by a headquarters at Jeddah, staffed by FAO, which would work in collaboration with the Saudi Arabian Government and be directed by a small Executive Committee. The Working Party also reviewed the status of the existing FAO committees on desert locust control and recommended the establishment of an overall FAO Desert Locust Control Committee.

San José Scale in Western Europe in 1953

The European Plant Protection Organisation has circularised a mimeographed report, based on information received from its member countries, on the 1953 situation of the San José scale (*Aspidiotus perniciosus*) in Western Europe. The following is a brief summary of it.

Since the scale was first introduced into Europe about 1930, it has become established in France, Germany, Switzerland, Austria, Yugoslavia, Italy, Spain and Portugal and also in some regions on the North African coast. In the Federal Republic of Germany, the main infested region is around Heidelberg in the Länder Württemberg-Baden and Rhineland-Palatinate, which is surrounded by zones of isolated spots of infestation, extending also into Hesse and South Baden. The pest did not spread beyond these limits in 1953, but within the limits it reappeared in a number of spots where it had been eradicated in previous campaigns. In France, the pest has become established mainly in the eastern and central parts of the country, where the Départements of Ain, Allier, Cher, Côte-d'Or, Jura, Nièvre, Rhône, Saône-et-Loire and Vaucluse are infested. In these main centers little change has occurred but in other regions some extension of infestation was recorded in 1953, when the pest was found as far north as the Département of Bas-Rhin close to the German frontier. In Austria, the main regions of infestation are situated in the east of the country, covering parts of Lower Austria, the Burgenland and parts of Steiermark. This area of general infestation extends into the north of Yugoslavia, spreading along the southern and western frontiers of Hungary and partly approaching Czechoslovakia and Romania. In Italy, the pest is widespread over the fruit-growing areas, with heaviest attacks occurring in the north (Torino, Bergamo and Mantua), and the north-east (Udine). In Spain a number of infested spots is found inland between Barcelona and the Pyrenees, where the pest spread in the province of Lerida and was newly reported from Seo de Urgel. No change occurred in the other infested regions along the coast east of Barcelona and from Valencia to the north. In the coastal zone of Portugal infested areas exist immediately north of Lisbon, and isolated centers of attack occur near Oporto and in the south. More inland the pest is found in the area of Coimbra.

It is indicated that, although most countries have succeeded in keeping it within the known infestation centers, this pest has by no means reached its ecological limits in Western Europe. The threat of its spread into countries still free persists and justifies the adoption of rigorous preventive measures.

INTERNATIONAL PLANT PROTECTION CONVENTION: ITS PRESENT STATUS

Since the approval of the International Plant Protection Convention by the FAO Conference in 1951, thirty-seven governments have signed it and three governments have adhered to it. Among these governments, nineteen have deposited with the Director-General of FAO the instruments of ratification, the instruments of adherence, or statements to the effect that ratification is not required in accordance with their legislative procedures. The Convention came into force for these Governments on the following dates when such instruments or statements were received:

Australia	27 August 1952
Austria	22 October 1952
Belgium	22 July 1952
Cambodia	10 June 1952
Canada	10 July 1953
Ceylon	12 February 1952
Chile	13 March 1952
Denmark	13 February 1953
Dominican Republic	20 June 1952
Egypt	20 July 1952
El Salvador	12 February 1953
India	9 June 1952
Japan	11 August 1952
Korea	8 December 1953
New Zealand	16 September 1952
Philippines	3 December 1953
Spain	18 February 1952
Sweden	30 May 1952
United Kingdom	10 August 1953

DIGEST OF PLANT QUARANTINE REGULATIONS: FIRST SUPPLEMENT

In advancing the objectives of the International Plant Protection Convention of 1951, a new edition of the Digest of Plant Quarantine Regulatios, covering forty countries and territories, was issued in 1952 as FAO Agricultural Development Paper No. 23. In addition to providing a medium for circulating information on legislation governing the imports of plants and plant products, it was considered that a better mutual understanding among governments would stimulate the improvement of existing plant quarantine measures and would lead to fuller international co-operation in the field of plant protection.

The First Supplement to this publication was published in May 1954 in multilithographed form. It contained summaries of the plant quarantine legislation of thirty-six countries and territories which were not covered in the Digest, namely:

Antigua	Gambia	Saint Helena
Barbados	Gilbert and Ellice Islands Colony	Saint Lucia
Bermuda	Gold Coast	Saint Vincent
British Guiana	Grenada	Sarawak
British Honduras	Kenya	Sierra Leone
British Solomon Islands	Maltese Islands	Singapore
British Virgin Islands	Mauritius	Spain
Cambodia	Montserrat	Spanish Morocco
Costa Rica	Nigeria	Sudan
Denmark	North Borneo	Tonga
Dominica	Northern Rhodesia	Trinidad and Tobago
Falkland Islands	Saint Christopher and Nevis	Uganda Protectorate
Fiji		Zanzibar Protectorate

The Digest and supplements are complementary to the plant quarantine announcements published in this Bulletin, with which they should be read. Further supplements will be issued from time to time to cover additional countries.

The First Supplement was supplied to the plant protection services of all FAO Member Governments and is obtainable from Plant Production Branch, Agriculture Division, FAO, Rome.

Roma - Tip. del Senato del dott. Giovanni Bardi

NEWS OF FAO PUBLICATIONS

Zebu Cattle

As was expected, the Spanish edition of this unique collection of information on the subject (*Zebu Cattle of India and Pakistan*, $3.00, 15s.) is in great demand in all parts of Latin America. First news of its success came from Argentina, and fresh supplies have been sent to Mexico.

The cattle breeders' press of the Southern States of U.S.A. is enthusiastic about this book. It says that no other publication has collected so much useful information about these important breeds, and the illustrations were liked.

Monograph on Legumes Reviewed

Favorable reviews in *Nature* (London) and *Tropical Agriculture* (London) of the FAO monograph *Legumes in Agriculture* ($3.00, 15s.) have increased the already lively demand for this monograph in all parts of the world. FAO is commended for collecting information on an important subject.

Continuing Demand for FAO Studies

Reports from London say that the demand for *Improving the World's Grasslands* (published for FAO by Leonard Hill Ltd., at 10s.) has been maintained. The second printing of *Soil Conservation: an International Study* (FAO, $2.00, 10s.) is widely used as a textbook in agricultural colleges.

Multilingual Vocabulary

Swedish, Dutch, Italian, Portuguese, Spanish, German, French, and English are the eight languages used in the *Multilingual Vocabulary of Soil Science* ($4.00, 20s.) recently published by FAO. It has been edited by G.V. Jacks in collaboration with soil scientists in all parts of the world. The project has been on the FAO program since 1949 and even in the very short time since the advance copies of the book have been in circulation, suggestions for improvements have come for consideration in the editing of a new edition. The vocabulary has already been in use at a meeting of soil scientists in Africa to which a small supply was taken by an FAO expert.

Mechanization of Agriculture

The *Agricultural Machinery Journal* (August 1954) devotes a long review to FAO Development Paper No. 44, *The Successful Introduction of Farm Mechanization* ($0.50, 2s. 6d.). It points out that the booklet has drawn on practical field experience gained in many underdeveloped countries by FAO experts on missions for the UN Expanded Technical Assistance Program, and it draws attention to the appendix which gives a suggested four-week syllabus for an excellent farm machinery course. Since the publication of this review, and a short notice in *Tropical Agriculture* (London) drawing attention to the practical approach of the book, our London agent has ordered fresh supplies.

Books on Agriculture

FAO Agricultural Studies now include 27 titles, and the newer series of Agricultural Development Papers has 44 titles. Bulletins about those two important series are ready and will be sent on request.

CATALOGUE OF PUBLICATIONS
1945-1954

FAO Documents Service and Sales Agents in all parts of the world are stocked with this new catalogue and bulletins describing new titles. These will be sent on receipt of a postcard indicating your particular interests.

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